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Today's Date: September 2, 2006

To: **Examiner Shedrick**, Art Unit: 2617 FAX: (571) 273-8300

From: Frederick E. Cooperrider #36,769
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In re Application of Yamashita et al

Serial No.: **10/714,672**

For: CELLULAR NETWORK ACQUISITION METHOD AND APPARATUS

Contents: 1. Appellants' Brief, as revised (34 pages)

Examiner Shedrick,

Attached is Appellants' Brief (originally submitted on July 17, 2006), as revised to address concerns, as best could be deciphered, in the Notification of Non-Compliant Appeal Brief mailed on August 4, 2006. Revisions to the original brief include:

1. Change in listing of claims pending on pages 1, 2, and 9;
2. Changes in Section V to specifically correlate the claim language to the text;
3. Change in Section VII, for Issue 4, to reflect that a check on PAIR suggests that the original Priority Document, as filed on July 12, 2004, was misplaced at the USPTO. Therefore, documents are also added to the Evidence Appendix to provide a copy of the original Priority Document submission cover page and to provide a copy of the Priority Document, as obtained from the UK Patent Office website;
4. Changes in Claims Appendix to change status "previously presented" to "rejected";
5. Addition to Evidence Appendix of evidence of the submission of the Priority Document, plus a copy of this document as obtained from the UK Patent Office.

It is noted that Appellants cannot decipher the intended deficiency in either the grounds of rejection section or arguments section, since it would appear that both these sections contain the required information. Therefore, pending clarification from the USPTO, Appellants have made no changes to address items 5, 6, and 10(3) in the Notification.

CERTIFICATION OF TRANSMISSION

I certify that I transmitted via facsimile to (571) 273-8300 this revised Appellants' Brief to the USPTO on September 2, 2006.

Frederick E. Cooperrider
Reg. No. 36,769

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:

Osamu Yamashita, et al.

Serial No.: **10/714,672** Group Art Unit: 2617

Filed: November 18, 2003 Examiner: Shedrick, Charles Terrell

For: **CELLULAR NETWORK ACQUISITION METHOD AND APPARATUS**

Honorable Commissioner of Patents
Alexandria, VA 22313-1450

APPELLANTS' BRIEF ON APPEAL

Sir:

Appellants respectfully appeal the rejection of claims 1-5, 7-14, and 16-20 in the Office Action mailed on February 14, 2006. A Notice of Appeal was timely filed on May 15, 2006. It is noted that the Office Action listing of claims is incorrect.

I. REAL PARTY IN INTEREST

The real party in interest is NEC Corporation, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1-5, 7-14, and 16-20, all of the claims presently pending in the application, stand rejected on prior art grounds. Claims 6 and 15 are canceled.

Claims 1, 2, 4, 8-11, 13, 14, 17, and 18 stand rejected under 35 USC §103(a) as unpatentable over WO 02/37889 to Ramesh et al., further in view of US Patent Publication 2004/0058650 to Palenius et al. Claims 3 and 12 stand rejected under 35 USC §103(a) as unpatentable over Ramesh/Palenius, further in view of US Patent Publication 2004/0203745 to Cooper. Claims 7, 16, 19, and 20 stand rejected under 35 USC §103(a) as unpatentable over Ramesh/Palenius, further in view of US Patent Publication 2004/0224684 to Dorsey et al.

The rejections are being appealed for all pending claims.

IV. STATUS OF AMENDMENTS

A Request for Reconsideration and Withdrawal of Final Rejection under 37 CFR §1.116 was filed on April 4, 2006. In the Advisory Action mailed April 21, 2006, the Examiner indicated that the rejections were maintained. The claims in the Appendix reflect the version of the claims of the Amendment Under 37 CFR §1.111 as filed on November 16, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

As explained at line 28 of page 4 through line 16 on page 5, Appellants have recognized that the 3GPP specification requirement for five measurements for each frequency within the frequency band be obtained within 3 seconds as being equally spaced does not necessarily mean that each of the large number of measurements be equally spaced from each other. The present invention uses the realization that only the measurements conducted on the same frequency need to be equally spaced (lines 8-13 on page 5).

Moreover, as explained at lines 12-18 of page 3, this technique allows a second band of frequencies to be searched, either within the same RAT (radio technology) or in another RAT, as well as second-stage search operations.

Therefore, Appellants' invention, as disclosed and claimed in, for example, independent claim 1 (independent claim 10 has corresponding language), is directed to

a method of determining a most suitable cell during network acquisition for a cellular communications device, based on a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies.

A series of measurements of the characteristic for each frequency of a first frequency band is taken, so as to obtain an average measurement value of the characteristic for each frequency of the first frequency band, wherein the series of measurements on the first frequency band are equally spaced in time, with equal time intervals therebetween.

During the time intervals between measurements for the first frequency band, a series of measurements of the characteristic for each frequency of a second frequency band is taken (lines 5-9 on page 6).

Thus, as shown in the Figure, during the four equal-time intervals 12,14,16,18 shown on the horizontal axis over which a first frequency 1 is to be measured five times A,B,C,D,E, the present inventors have recognized that all remaining frequencies (e.g., 2 through n, shown in the vertical axis) of the RAT under evaluation can be rapidly and sequentially measured immediately after each respective measurement A,B,C,D,E of the first frequency 1.

As further explained at lines 17-24 on page 5 (and reflected in the independent claims), there are exemplarily (at least) two bands of frequencies represented in the n = 546 frequencies shown in the vertical axis: the EGSM 900 band contains 172 frequencies, and the GSM 1800 band contains 374 frequencies. Alternatively, as mentioned above, the second band might be for a second RAT.

Thus, the two independent claims being appealed are described in the text and figures, as follows. It is noted that only independent claim 1 is represented below, since independent claim 10 is a device claim that corresponds to the method claim of claim 1.

Independent claim 1: A method of determining a most suitable cell (lines 1-3 of page 1) during network acquisition for a cellular communications device, based on a characteristic of signals received from a plurality of cells (lines 25-28 of page 1), the signals from each cell being provided over a band of frequencies, said method comprising:

taking a series of measurements (e.g., A through E in figure, also lines 17-18 on

page 5) of said characteristic for each frequency of a first frequency band (item 10 in figur includes a first band, also line 19 of page 5), so as to obtain an average measurement value (line 16 of page 5) of said characteristic for each frequency of said first frequency band, wherein the series of measurements on said first frequency band are equally spaced in time, with equal time intervals therebetween (see figure, also line 28 of page 1 through line 3 of page 2 and lines 11-13 of page 5); and

during the time intervals between measurements for said first frequency band, taking a series of measurements of said characteristic for each frequency of a second frequency band (lines 19-24 of page 5).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Upon further review, it is clear that the rejection currently of record is deficient for even more reasons that previously identified during prosecution. Therefore, Appellants present various issues for review by the Board of Patent Appeals and Interferences, as follows:

ISSUE 1: Whether the plain meaning of the independent claims is satisfied by the primary reference Ramesh, even if all secondary references currently of record are combined;

ISSUE 2: Whether primary reference Ramesh can be modified in the manner urged in the rejection currently of record without improperly changing its principle of operation;

ISSUE 3: Whether secondary references Palenius and Cooper are properly combinable with primary reference Ramesh unless they are considered analogous art or reasonably related to the problem of the present invention; and

ISSUE 4: Whether the rejection based on secondary reference Dorsey can be maintained when its U.S. filing date precludes it as prior art against the present application because of the foreign priority date of the present application.

VII. ARGUMENTS

ISSUE #1: The plain meaning of the claim language relative to the primary reference

Appellants submit that the rejection under 35 U.S.C. § 103(a) cannot be maintained because it fails to properly correlate terminology and, when such correlation is made, this reference has more deficiencies than presently identified by the rejection currently of record.

A. The Examiner's position on the deficiencies of the primary reference

In final paragraph on page 3 and the first paragraph on page 4 of the Office Action mailed on February 14, 2006, the Examiner seemingly alleges that, relative to the independent claims, the only deficiency of primary reference Ramesh is that it fails to "... specifically teach during the time intervals between measurements for said fi[r]st frequency band, taking a series of measurements of said characteristic for each frequency of a second frequency band."

B. Appellants' position on the deficiencies of primary reference Ramesh

Appellants submit that the rejection currently of record fails to properly correlate the terminology of the independent claims with the concepts and terminology taught in the primary reference and, therefore, fails to meet the initial burden of a *prima facie* rejection, since there are various other problems than the single alleged deficiency.

More specifically, first, the present wording of the independent claims requires that the technique be used for selecting the most suitable cell. In contrast, Ramesh clearly describes its technique as directed to selection of the most suitable channel.

Second, the independent claims clearly define that the frequencies being analyzed are included in at least two distinct frequency bands. In the example discussed on page 5 of the specification, the diagram exemplarily shows n = 546 different frequencies being measured in the first RAT. There are exemplarily two bands of frequencies being included in these 546 frequencies (172 frequencies in the

EGSM 900 band and 374 frequencies in the GSM 1800 band). Alternatively, there may be two RATs involved.

In contrast, primary reference Ramesh is based upon the concepts of "carriers" and "channels", presumably because that reference addresses the EDGE Compact standard, described at lines 21-22 of page 4 as being a variant of the GSM standard that is exemplarily used to discuss the present invention. The flowchart shown in Figure 7 of Ramesh is clearly oriented in the unit of "carrier" and further demonstrates the division of carriers into "groups". There is no indication in Ramesh that "frequency" and "carrier" are intended as being equivalent, but it appears that a "carrier" involves both a frequency and a time slot, and it seems clear that Ramesh does not intend the selection of a "carrier" to be equivalent to the selection of a "cell".

Nor is there any indication in the rejection currently of record that Ramesh addresses two distinct bands of frequencies, nor is there any indication that the search being conducted in Ramesh is a simple search of frequencies, as required by the plain meaning of the independent claims.

Appellants submit that this difference in terminology results because the purpose of Ramesh is that of selecting a "channel" as defined in the EDGE Compact standard, whereas, the present invention is defined in the independent claims as selecting the "... most suitable cell during network acquisition", as oriented toward at least the GSM bands and, possibly, different modes, including GSM and UMTS (e.g., see claims 7 and 16).

Indeed, the description at lines 9-11 of page 2, Ramesh appears to attempt to clarify that its method is intended specifically for channel selection in the EDGE standard. Moreover, since geographic regions or "cells" are clearly described in lines 3-4 of page 5 of Ramesh as being a concept different from "carrier", it is clear that selection of a "cell" is not equivalent to selection of a "carrier" in Ramesh.

Therefore, Appellants submit that the rejection currently of record fails to properly address the plain meaning of the claim language of even the independent claims 1 and 10, and that the rejection, therefore, fails the initial burden of a *prima facie* rejection until such analysis is properly made of record, including an analysis of whether "channel" selection is equivalent to "cell" selection.

ISSUE #2: Whether primary reference Ramesh can be modified without changing its principle of operation

Appellants submit that, until the terminology discrepancy noted above is properly addressed on the record, the next issue is whether it would then make sense to consider modifying Romesh to use the same technique used to select a carrier to also be used to select a "cell", as that term is defined in lines 3 and 4 of page 5 of that reference itself.

ISSUE #3: Whether secondary references Palenius and Cooper are properly combinable with primary reference Ramesh

The rejection currently of record attempts to define all secondary references as properly combinable by summarily declaring them as "In the same field of endeavor...." and then reciting that it, therefore, is obvious to simply incorporate the element conceded as missing.

Appellants submit that such conclusory rationale fails to meet the standard of a properly combinable secondary reference and that the rejection fails to meet the initial burden of a *prima facie* rejection until the proper standard of modifying a primary reference has been addressed on the record.

More specifically, primary reference Ramesh is clearly directed to selection of a channel, indicating a purpose of initial contact to a network. In contrast, as Appellants have previously pointed out on the record, secondary reference Palenius, as indicated in paragraphs [0014] and [0033] is not directed to an initial network acquisition.

Also in contrast to the purpose of the primary reference Ramesh, secondary reference Cooper has the different purpose of selecting which communication system should be acquired.

Therefore, Appellants submit that, because of the different purposes, it is improper to attempt to modify the primary reference Ramesh. The rejection currently of record attempts to justify the combination of these secondary references by reciting a purpose that would appear to already be satisfied in Ramesh or would change the purpose of the Ramesh.

For example, in the urged combination with Palenius, wherein the Examiner attempts to argue that there would be "efficient cell search", Ramesh is clearly directed

toward an efficient channel search, not a cell search and there is no indication in the rejection why Ramesh would be considered by one having ordinary skill in the art as being inefficient in its search.

Relative to secondary Cooper, the Examiner first incorrectly attempts to define "signal to noise ratio" as satisfying the plain meaning of the terminology "derivative of signal strength", wherein, to one having ordinary skill in the art, the term "derivative" means a rate of change. Second, Cooper addresses the purpose of deciding which system is to be connected to, whereas primary reference Ramesh is directed to the different purpose of connecting to a network, rather than deciding which network to connect to.

Appellants submit that, because of these different purposes, it would be improper to combine them with Ramesh. Specifically, Appellants submit that the Examiner attempts to consider the elements conceded as missing in the primary reference to be abstract ideas that are freely combinable by merely locating the element in another prior art reference. Appellants submit that the different purposes of the secondary references precludes such simplistic combination.

ISSUE #4: Whether secondary reference Dorsey qualifies as a prior art reference when its U.S. filing date of May 7, 2003, is later than the UK foreign priority date of November 19, 2002, for the present application.

The priority document was filed on July 12, 2004. The Examiner has yet to acknowledge receipt of the same, and it appears, from an analysis in PAIR, that the UK document itself has been lost by the USPTO.

Therefore, in the Evidence Appendix, Appellants submit a copy of the cover page for the July 12, 2004, submission of the priority document, along with the ribboned cover page of the document submitted. Since Appellants' representative did not retain a copy of the actual document submitted along with the ribboned cover page, also attached is a copy of the UK Patent GB 2395622, as corresponding to UK Application 0226980.1, as obtained from the UK Patent Office website.

Appellants submit that, as a matter of law, Dorsey fails to qualify as prior art against the present application, since no translation would be necessary for the UK application. If the copy of the document, as obtained from the UK Patent Office

website is not sufficient for purpose of this Appeal, Appellants request that the USPTO advise Appellants so that another certified copy can be ordered.

VIII. CONCLUSION

In view of the foregoing, Appellants submit that claims 1-5, 7-14, and 16-20, all the claims presently pending in the application, are clearly patentably distinct from the prior art of record and in condition for allowance. Thus, the Board is respectfully requested to remove all rejections of claims 1-5, 7-14, and 16-20.

Please charge any deficiencies and/or credit any overpayments necessary to enter this paper to Attorney's Deposit Account number 50-0481.

Respectfully submitted,

Dated: 9/2/06

Frederick E. Cooperrider
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CLAIMS APPENDIX

Claims, as reflected upon entry of the Amendment Under 37 CFR §1.111, filed on November 16, 2005, are as follows.

1. (Rejected) A method of determining a most suitable cell during network acquisition for a cellular communications device, based on a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, said method comprising:

taking a series of measurements of said characteristic for each frequency of a first frequency band, so as to obtain an average measurement value of said characteristic for each frequency of said first frequency band, wherein the series of measurements on said first frequency band are equally spaced in time, with equal time intervals therebetween; and

during the time intervals between measurements for said first frequency band, taking a series of measurements of said characteristic for each frequency of a second frequency band.

2. (Rejected) A method as claimed in Claim 1, wherein said characteristic comprises the signal strength.

3. (Rejected) A method as claimed in Claim 1, wherein said characteristic comprises a derivative of the signal strength.

4. (Rejected) A method as claimed in Claim 1, wherein said series of measurements comprises a series of five measurements.

5. (Rejected) A method as claimed in Claim 1, wherein each of said equal time intervals is in the order of 0.5 second.

6. (Canceled)

7. (Rejected) A method as claimed in Claim 19, wherein one operating mode comprises GSM, and the other operating mode comprises UMTS.

8. (Rejected) A method as claimed in Claim 1, wherein said first and second frequency bands operate in a single operating mode, and second stage search operations are conducted during said equal time intervals.

9. (Rejected) A method as claimed in Claim 8, wherein said second stage operations are conducted on cells found to have high signal strength after the first measurement.

10. (Rejected) A cellular communications device for determining a most suitable cell during network acquisition for a cellular communication device, based upon a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, said cellular communication device comprising:

a first unit for taking a series of measurements of the characteristic for each frequency of a first frequency band, so as to obtain an average measurement value of the characteristic for each frequency of the first frequency band, wherein the series of

measurements on the first frequency band are equally spaced in time, with equal time intervals therebetween; and

a second unit for taking a series of measurements of the characteristic for each frequency of a second frequency band during the time intervals between the measurements for the first frequency band.

11. (Rejected) A device as claimed in Claim 10, wherein said characteristic comprises the signal strength.

12. (Rejected) A device as claimed in Claim 10, wherein said characteristic comprises a derivative of the signal strength.

13. (Rejected) A device as claimed in Claim 10, wherein said series of measurements comprises a series of five measurements.

14. (Rejected) A device as claimed in Claim 10, wherein each of said equal time intervals is in the order of 0.5 second.

15. (Canceled)

16. (Rejected) A device as claimed in Claim 20, wherein one operating mode comprises GSM, and the other operating mode comprises UMTS.

17. (Rejected) A device as claimed in Claim 10, wherein said device is for use with a

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single mode cellular communications device, and second stage search operations are conducted during said equal time intervals.

18. (Rejected) A device as claimed in Claim 17, wherein said second stage operations are conducted on cells found to have high signal strength after the first measurement.

19. (Rejected) A method as claimed in Claim 1, wherein said first and second frequency bands operate in different operating modes.

20. (Rejected) A device as claimed in Claim 10, wherein said first and second frequency bands operate in different operating modes.

EVIDENCE APPENDIX

1. Evidence of submission of priority document on 7/12/04, including a copy of the ribboned cover page bearing signature of a Mr. Mahoney, as dated 9/18/03 (pages 14_A, 14_B).

2. Evidence of the document corresponding to the UK Application 0226980.1, as obtained from the UK Patent Office website (pages 14_C through 14_S). Appellants' representative did not retain a copy of the priority document itself in their file, so that the attached copy of the website document is the only copy readily available. Should this website copy be unacceptable, Appellants request that the USPTO contact Appellants' representative so that a second certified copy of the UK application can be ordered.

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Docket No.: WN-2622
GOT.081

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Osamu Yamashita, et al.

Serial No.:	10/714.672	Group Art Unit:	2681
Filing Date:	November 18. 2003	Examiner:	Unknown

For: CELLULAR NETWORK ACQUISITION METHOD AND APPARATUS

Honorable Commissioner of Patents
Alexandria. VA 22313-1450

SUBMISSION OF PRIORITY DOCUMENT

Sir:

Submitted herewith is a certified copy of United Kingdom Application Number 0226980.1 filed on November 19. 2003. upon which application the claim for priority is based.

Respectfully submitted.

46060

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Date: 7/12/04

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(14_A)

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I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed P. Mahoney

Dated 18 September 2003

(12) UK Patent Application (19) GB (11) 2 395 622 (13) A

(43) Date of A Publication 26.05.2004

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(22) Date of Filing: 19.11.2002

(51) INT CL[7]: H04Q 7/32

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(58) Field of Search: UK CL (Edition V) H4L LRRMQ INT CL[7] H04Q 7/32 7/38 Other: ONLINE: EPODOC, WPI, JAPIO

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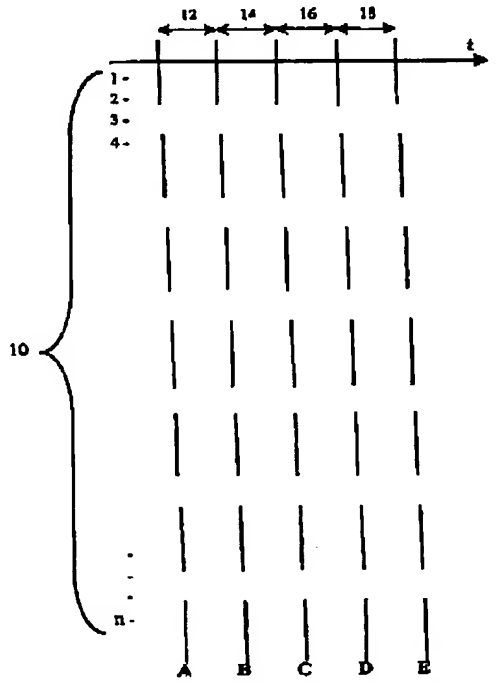
(54) Abstract Title: Cellular network acquisition method and apparatus

(57) A method of finding a suitable cell in which to establish communication, where each cell has a plurality of frequencies available for communication, comprises taking a series of signal measurements (A,B,C,D,E) at each frequency so as to obtain an average value. Each measurement in the series is taken for all of the frequencies as quickly as possible (1,2,3,4...n) before the next measurement in the series is taken. The measurements on any one frequency are equally spaced, and the intervals between each of the series of measurements may be used for processing signals from other cells or other networks.



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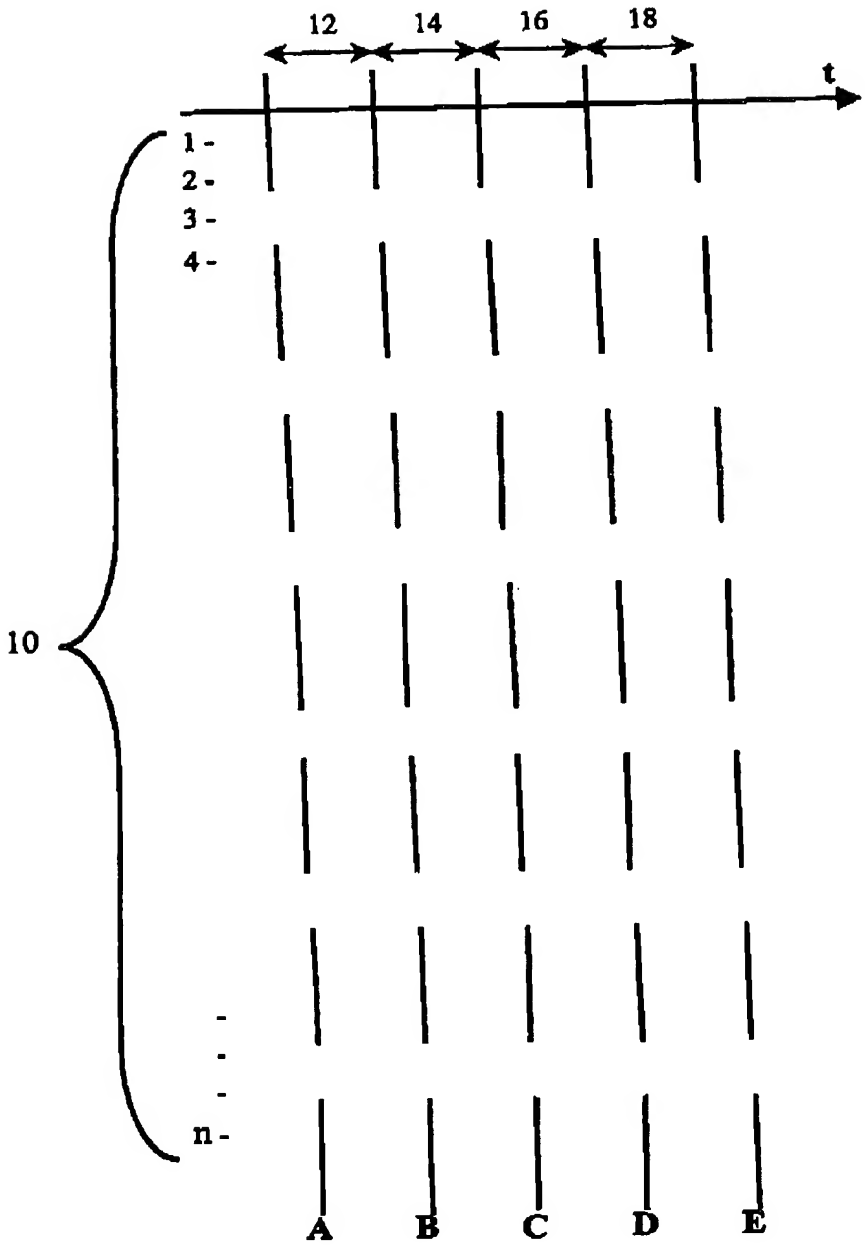

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CELLULAR NETWORK ACQUISITION METHOD AND APPARATUS

The present invention relates to a method and apparatus for use in network acquisition for cellular communications devices.

Cellular communications devices such as cell phones, have become increasingly popular and widely adopted and in many instances have become the prime means of communication both for business and domestic requirements.

As such usage becomes more widespread, potentially disadvantageous and limiting features of such devices become more apparent. For example, when a cell phone is first turned on, an acquisition procedure needs to be conducted so that the cell phone can acquire the appropriate communications network and subsequently take part in a communications exchange over that network. The period between turning the cell phone on and actually acquiring the network does not generally go unnoticed by the user and comprises dead time as far as the user is concerned since no other operations over and above network acquisition are conducted during that period. The longer the time period required to acquire the network, the more likely this period is to be noticed by the user and so as to lead to potential irritation.
Also, network acquisition procedures require the cell phone handset to expend a significant amount of power relative to power requirements arising merely for communication procedures.

Indeed, in view of the different mobile communication modes that have arisen, and the subsequent requirement for cell phone handsets to offer dual mode, or indeed multimode, operability, it will become increasingly necessary for each handset to search on more than one mode. Thus potential delays in network acquisition, and related user irritation, could become more frequently experienced. As explained further below network acquisition requires a search

through a set of frequencies – generally defined by a frequency band in an attempt to identify the most suitable cell of a network. With dual mode operation, there will be multiple sets of frequencies to search through in order not only to find the most suitable cell, but also the most suitable network given the at least dual mode operability of the handset.

The present invention seeks to provide for a network acquisition method and apparatus which exhibits advantages over known such methods and apparatus.

According to a first aspect of the present invention, there is provided a method of network acquisition for a cellular communications device comprising determining a most suitable cell based on a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, and the said determination comprising the steps of taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all of the frequencies in the said band before the next measurement in the series is taken, and the said series of measurements on each frequency are equally spaced and serve to provide equal intervals therebetween for further processing of signals from network cells or reception and processing of signals from cells on another network.

The present invention is advantageously based upon the realisation that, while network acquisition is generally required within a predetermined time period, the acquisition steps can be arranged so as to lead to the aforesaid equal intervals which can subsequently be used for signal processing such as that related to, for example, additional network acquisition procedures.

Insofar as such additional procedures are carried out within what was previously found to be mere dead time, the amount of dead time is in fact

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decreased such that, for example with regard to a dual mode handset. The speed with which acquisition procedures for both radio technology modes can be conducted is advantageously increased.

Advantageously, the said characteristic comprises signal strength, or a derivative thereof, and the number of measurements in the series required so as to arrive at the average value can be in the region of five.

In one embodiment, each of the said equal intervals can be determined to be in the region of 0.5 seconds such that, when employing a series of 5 measurements, there are four such equal intervals leading to a total additional available processing time of two seconds.

Preferably, the method can be employed within a dual mode, or multi-mode device, such that the equal intervals arising during the search on one radio technology (RAT), for example GSM, can be employed for acquisition steps relating to second RAT, for example, UMTS.

Alternatively, and in particular with a single mode device, so-called second stage search operations on cells found to have, for example, high signal strength, can be conducted during the said equal intervals.

According to another aspect of the present invention, there is provided a cellular communications device including means for determining a most suitable cell based upon a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, the said means for determining comprising means for taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all the frequencies in the band before the next measurement in the series is taken, and such that the said series of measurements on each frequency are

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equally spaced so as to serve to provide equal intervals there between for the further processing signals from the network cells.

Such a device an advantageously be arranged to operate in accordance with the previously defined method steps.

The invention described further hereinafter, by way of example only, with reference to the accompanying drawing, which illustrates acquisitions steps in accordance with a method embodying the present invention.

The following description relates to one example of the present invention for use in relation to a dual mode handset which is required to operate in accordance with two RATs such as, for example, GSM and UMTS.

Some operating specifications, such as the current 3GPP specifications require that a handset search only one RAT at a time. The relative priority of the different RATs is generally set within the handset. Thus, for example, with a dual mode GSM/UMTS handset, a search of the second RAT, for example UMTS, during initial selection is only made if no suitable cells are found when searching in relation to the first RAT, such as GSM.

Such initial searching procedures are relatively simple. For example, using the strength of signals received from the cells, the cells are ranked in order of signal strength and the cell found to be at the top of the list is then accessed for suitability. If suitable, that cell, and the related RAT is effectively acquired by the handset. If not, then a search of the second RAT is conducted.

The 3GPP specification requires that five measurements for each frequency within the frequency band are required to be conducted over a period of no less than 3 seconds in order to produce an average value by

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which the cell is ranked in accordance with the process noted above. The measurements are also required to be equally spaced.

While it has previously been thought that such requirements dictate that each of the large plurality of measurements has to be a set equal time period away from the previous measurement. The present invention takes advantage of the realisation that such requirements are not in fact necessary in practice.

In accordance with the present invention, it is realised that it is only the measurements conducted on the same frequency that need to be equally spaced and so the acquisition procedure according to the present invention is conducted merely to ensure that it is only such measurements that need be equally spaced and this serves to free-up the time that was previously taken ensuring that all measurements were equally spaced. This further time that is now available within the acquisition procedure and which no longer represents part of the dead time, is therefore available in accordance with the present invention for subsequent acquisition procedures if required.

Turning now to the accompanying drawing, there is illustrated a series of five measurements A-E taken over time t and in relation to a range of frequencies 1-n forming a frequency band 10 in accordance with a first RAT. In the example illustrated, the acquisition procedures being conducted in relation to the GSM mode and the frequency band 10 actually comprises two GSM bands; the EGSM 900 band which contains 172 frequencies, and the GSM 1800 band containing 374 frequencies. Thus, in the illustrated example, n=546 in that there are 546 different frequencies which are to be measured.

As noted above, and in accordance with the 3GPP specification, the series of five measurements A-E are to be taken over a period of no less than 3 second. Thus, the final measurement E must be taken at a period of at least t=3 seconds or more.

(14_I)

As discussed above, the acquisition procedure is arranged such that it is only the spacings 12, 14, 16, 18 between the series measurements that are equal since, in accordance with the present invention, each of the 546 measurements taken against the frequencies in band 10 and forming the first measurement in the series A do not need to be equally spaced.

Thus, in operation, the first measurement in the series A is taken for all 546 frequencies before the procedure moves to the second measurement B in the series. Since equal spacing between all of the 546 measurements forming the first measurement A in the series is not required, the invention can simply operate to ensure that the 546 measurements are taken as quickly as possible.

It is identified that it takes approximately 350μs to tune to a particular frequency and perform a measurement. Thus, in relation to the entire frequency band 10 for the EGSM 900 and GSM 1800 bands, it will take a total of 0.19 seconds to perform each of the required measurement: that is it will effectively take 0.19 seconds to perform each of the five series of measurements A-E shown in the drawings.

However, and as discussed above, in order to arrive at an average value, five measurements per frequency are taken, i.e. the five measurements A-E illustrated in the drawing, and so this increases the total time required to arrive at the average value on each of the 546 frequencies to 0.95 seconds.

However, insofar as there is a minimum of 3 seconds required to arrive at the final measurements E in the series, and only 0.95 second of this 3 second period is in fact used in the frequency measurement, this leaves just over 2 seconds of the 3 seconds period defined in accordance with the 3GPP specification that can be employed for other purposes.

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Returning to the particular requirement of the present invention, i.e. that it is only the spacings 12, 14, 16 and 18 that need to be of equal length, and given that an available period of just over 2 seconds is identified, it arises that each of the spacings 12-18 can be in the order of 0.5 seconds.

Periods of such length can be advantageously employed for further signal processing activity.

As one example and in a dual-mode handset, the four periods of 0.5 seconds can be arranged to search the other of the two RATs. For example, since UMTS has a similar searching averaging requirement to GSM, the UMTS measurements can be placed within the 0.5 second intervals 12-18 arising during the GSM operation and the GSM averaging requirements can still be met. It is then possible to draw up a combined list of GSM and UMTS cells to be considered for cell selection. This can prove particularly advantageous in that a choice can then be made to select either of the two modes and in a manner which requires a time period comparable with that currently known merely to search on one RAT.

As a second example, and one that arises in relation to a single mode phone, the second stage search operations on the cells found have high signals after the initial batch of measurements can be conducted during the 0.5 second periods 12-18. Such operations would normally be performed once the previously mentioned averaging stages have been completed. However, if an initially strong signal is located, there is no particular disadvantage in attempting to read the signal even the signal strength may not yet have been averaged. Again, this can lead to a vastly more efficient use of the acquisition period so as to lead to time saving and reduction in dead time experienced by the user.

It should however be appreciated that the invention is not restricted to the details of the foregoing embodiments. For example the invention can be

(14-K)

employed within multi-mode handsets for any two or more appropriate RATs and the equal spacing between the series of measurements can comprise different values from those noted above particularly when determined in accordance with different operating specifications.

Claims

1. A method of network acquisition for a cellular communications device comprising determining a most suitable cell based on a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, and the said determination comprising the steps of taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all of the frequencies in the said band before the next measurement in the series is taken, and the said series of measurements on each frequency are equally spaced and serve to provide equal intervals therebetween for further processing of signals from network cells or reception and processing of signals from cells of another network.

2. A method as claimed in Claim 1, wherein the said characteristic comprises signal strength.

3. A method as claimed in Claim 1 wherein the said characteristic comprises a derivative of the signal strength.

4. A method as claimed in Claim 1, 2 or 3, wherein the said series measurements comprises a series of five measurements.

5. A method as claimed in any one or more of Claims 1-4, wherein the said equal intervals are each in the order of 0.5 second.

6. A method as claimed in any one or more of Claims 1-5, and arranged for at least dual mode operation wherein a search of the RAT according to a second mode is conducted during the said equal intervals.

7. A method as claimed in Claim 6 wherein one RAT comprises GSM and a second RAT comprises UMTS.

8. A method as claimed in any one of Claims 1-5 and for use with a single mode cellular communications device in which second stage search operations are conducted during the said equal intervals.

9. A method as claimed in Claim 8, wherein the said second stage operations are conducted on cells found to have high signal strength after initial measurement.

10. A cellular communications device including means for determining a most suitable cell based upon a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, the said means for determining comprising means for taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all the frequencies in the band before the next measurement in the series is taken, and such that the said series of measurements on each frequency

are equally spaced so as to serve to provide equal intervals therebetween for the further processing of signals from the network cells.

11. A device as claimed in Claim 10 and arranged to operate in accordance with the method steps of any one or more of Claims 2-9.

12. A method of network acquisition for a cellular communications device substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

13. A cellular communications device substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

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Amendments to the claims have been filed as follows

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Claims

1. A method of network acquisition for a cellular communications device comprising determining a most suitable cell based on a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, and the said determination comprising the steps of taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all of the frequencies in the said band before the next measurement in the series is taken, and the said series of measurements on each frequency are equally spaced and serve to provide equal intervals therebetween for further processing of signals from network cells or reception and processing of signals from cells of another network.

2. A method as claimed in Claim 1, wherein the said characteristic comprises signal strength.

3. A method as claimed in Claim 1 wherein the said characteristic comprises a derivative of the signal strength.

4. A method as claimed in Claim 1, 2 or 3, wherein the said series measurements comprises a series of five measurements.

(14EP)

5. A method as claimed in any one or more of Claims 1-4, wherein the said equal intervals are each in the order of 0.5 second.

6. A method as claimed in any one or more of Claims 1-5, and arranged for at least dual mode operation wherein a search of a radio access technology according to a second mode is conducted during the said equal intervals.

7. A method as claimed in Claim 6 wherein one radio access technology comprises GSM and a second radio access technology comprises UMTS.

8. A method as claimed in any one of Claims 1-5 and for use with a single mode cellular communications device in which second stage search operations are conducted during the said equal intervals.

9. A method as claimed in Claim 8, wherein the said second stage operations are conducted on cells found to have high signal strength after initial measurement.

10. A cellular communications device including means for determining a most suitable cell based upon a characteristic of signals received from a plurality of cells, the signals from each cell being provided over a band of frequencies, the said means for determining comprising means for taking a series of measurements of the said characteristics for each frequency so as to obtain an average value, wherein each measurement in the said series is taken for all the frequencies in the band before the next measurement in the series is taken, and such

(14Q)

that the said series of measurements on each frequency are equally spaced so as to serve to provide equal intervals therebetween for the further processing of signals from the network cells.

11. A device as claimed in Claim 10 and arranged to operate in accordance with the method steps of any one or more of Claims 2-9.

12. A method of network acquisition for a cellular communications device substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

13. A cellular communications device substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawing.

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Application No: GB 0226980.1 15 **Examiner:** Nigel Hall
Claims searched: all **Date of search:** 30 April 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
		NONE

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[V]:

H4L

Worldwide search of patent documents classified in the following areas of the IPC[7]:

H04Q

The following online and other databases have been used in the preparation of this search report :

Online: EPODOC, WPI, JAPIO

RELATED PROCEEDINGS APPENDIX

(NONE)